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FREEZE/THAW TRANSITIONS AI' THE BOREAS SITES USING ERS-1 IMAGING RADAR

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Measurements of the length of the growing season may significantly improve current estimates of net annual CO_2 flux in the boreal regions. For coniferous forest species, the summer frost free period bounds the growing season length. Both coniferous and deciduous tree types are driven in their growth potential by active mineral and water uptake through the soil. Estimating the duration of favorable soil temperature regimes is therefore of equal ecological significance as the temperature regime of the above-ground biomass. Based on AIRSAR and ERS-1 measurements collected in Alaska, freezing results in a significant drop in radar backscatter.

In addressing the use of imaging radar data for estimating growing season length, there are two questions to be addressed. First, the relationship between canopy, "bole and soil freezing and the beginning and end of seasonal photosynthetic activity must be ascertained. Secondly, the sensitivity of spaceborne imaging radar sensors to freeze/thaw processes must be assessed. In particular, is SAR sensitive to canopy or soil freezing, or both?

To address these questions, *in situ* soil, stem and root temperatures, and stem xylem flux were measured over a complete annual cycle in 1994 at the BOREAS test sites. ERS-1 data were also acquired throughout 1994; in the early Ice Phase, three day repeat data provided detailed sampling of the BOREAS sites. During the Geodetic Phase, data over a particular site were available on approximately 15 day repeat cycles. The temperature and xylem flux data show a clear transition in soil and stem thawing and start of growing season. This information will be correlated with the ERS-1 data where freeze/thaw transitions show clear changes in radar backscatter. The implications on annual CO_2 flux estimates will be discussed.

Preferred topic area: Special Session on BOREAS